Physics S1

Newtonian Physics

Physics S2

Electromagetic Spectra

Every day <u>each</u> group will need:

- **One physics textbook**
- **One computer**

Each activity includes:

WDYS

WDYT

Investigate

Physics Talk

Checking up

Physics to Go

Chapter 5: Let Us Entertain You 1/17/17

Chapter Challenge (p. 480)

24 min { Sound - one prerecorded sound allowed, 3 sounds
Light - 2 light

Explanation (unlimited time)

Creativity

Entertainment

5.1 Sounds in Vibrating Strings (p. 484) 1/17/17

WDYS: *There is a girl in a wheelchair, holding down a string that stretches across a wooden table. She's smiling and has one hand up while a boy is crouching backwards, holding a ball in his hand. There is music coming from a long round object that reminds me of a pringles can. The string is over it and a weight holds the other side of the string down at the other end of the table. There are little waves and straight lines coming from the object/pringles can thing. There is also a dog playing an instrument that has little waves coming from it. I see a girl on a wheel chair pressing on a string against the table and a can rolling under the string and making noise because of the music note, a boy leaning back because he is surprised, a drink that spilled on the floor, a dog playing a chelow made out of cardboard, the dog looks proud and relaxed.*

WDYT: *Guitarists and violinists make different sound by the way the instruments strings are tone. He would have to move his left hand closer to the right hand in order to get a higher note.*

5.1 Sounds in Vibrating Strings (p. 484)

IWBAT

- determine the effect of string length on the pitch of the sound produced
- determine the effect of tension on the pitch of the sound produced
- summarize experimental results.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.1 Sounds in Vibrating Strings (p. 484)

Investigate:
Follow ALL safety precautions.

IWBAT determine the effect of string length on the pitch of the sound produced, determine the effect of tension on the pitch of the sound produced, and summarize experimental results.

5.1 Sounds in Vibrating Strings (p. 484)

Physics Talk (p. 486)

Something vibrating makes sound
The two variables are how long the string is and the tension of the string.
The pitch is how high or low the music/sound is
String length depends on instrument size
To increase the pitch, you can increase the tension and/or decrease the length

IWBAT determine the effect of string length on the pitch of the sound produced, determine the effect of tension on the pitch of the sound produced, and summarize experimental results.

5.1 Sounds in Vibrating Strings (p. 484)

Checking Up (p. 487) # 1-4
Physics to Go (p. 490) # 1-4, 6-8
WDYTN

IWBAT determine the effect of string length on the pitch of the sound produced, determine the effect of tension on the pitch of the sound produced, and summarize experimental results.

5.2 Making Waves (p. 492) 1/23/17

WDYS: *I see a girl and a dog surfing on a rope along with a boy holding the rope. There is also people surfing in the ocean, a cat sitting under an umbrella and on top a towel. There is sand, two buckets, a ball, fish skeleton a little bowl, and a person that looks like they're drowning. I see a wave being done with a slinky, Waves in the back, A surfer with a dog, A drink on the ground, A cat with sunglasses on a beach towel under an umbrella*

WDYT: *The way the water moves to make a wave is by vibrations in the ocean's floor or objects that make the water move. Water needs some kind of a force to move or vibration. I think that water makes waves by wind blowing the water.*

5.2 Making Waves (p. 492)

IWBAT

- calculate the speed of a wave pulse
- investigate the relationship among wave speed, wavelength, and frequency
- make a model of wave motion
- distinguish between transverse and longitudinal waves.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.2 Making Waves (p. 492)

Investigate (p. 492)

Be careful to not overstretch the slinky.

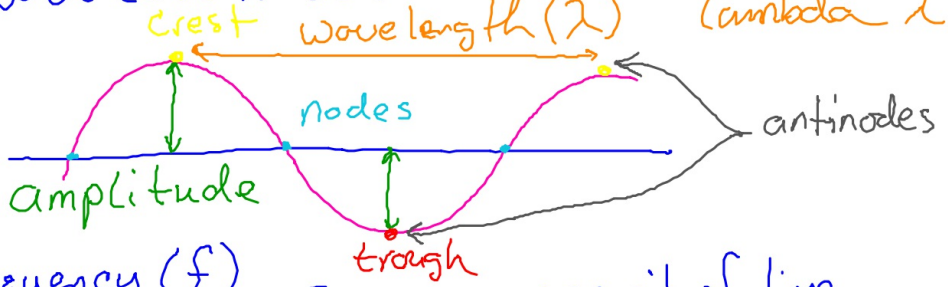
IWBAT calculate the speed of a wave pulse, investigate the relationship among wave speed, wavelength, and frequency, make a model of wave motion, and distinguish between transverse and longitudinal waves.

5.2 Making Waves (p. 492)

Physics Talk (pp. 498-502)

a wave is a transfer of energy w/ no net transfer of mass

a medium is a material through which a wave can travel



frequency (f) the number of waves per unit of time

period (T) the time required for one complete wave to pass a point $T = 1/f$

IWBAT calculate the speed of a wave pulse, investigate the relationship among wave speed, wavelength, and frequency, make a model of wave motion, and distinguish between transverse and longitudinal waves.

5.2 Making Waves (p. 492)

Checking Up (p. 502) # 1-3
Physics to Go (p. 505) # 1-6, 10-14
WDYTN

IWBAT calculate the speed of a wave pulse, investigate the relationship among wave speed, wavelength, and frequency, make a model of wave motion, and distinguish between transverse and longitudinal waves.

5.3 Sounds in Strings Revisited (p. 508) 1/30/17

WDYS: *I see a boy playing sound with a broom,string, and a metal box along with a girl playing the harp, a poster that says "standing waves" with a person sleeping on a wave, a couple people in the audience, a cat, brick wall, and wooden floor.I See a guy standing up and playing a brome and the box under it and a string attached to the brome down to the box, a girl playing a harp and both her and the guy are making sound.*

WDYT: *The pitch changes when you change the tension in the string because the tighter the string is, the faster the vibration travles which cause the higher pitch. When the sting is loose, the sound is deeper since the vibration moves a slower speed because the string is longer.*

5.3 Sounds in Strings Revisited (p. 508) 1/30/17

IWBAT

- calculate the wavelength of a standing wave on a string
- describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.3 Sounds in Strings Revisited (p. 508)

Investigate

Follow all safety procedures.

This procedure should take about 30 min .

$v = f\lambda$

velocity (m/s) = frequency (1/s) · wavelength (λ) (m)

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.3 Sounds in Strings Revisited (p. 508)

Physics Talk (p. 510)

$v = f\lambda$ $f = \frac{v}{\lambda}$ $\lambda = \frac{v}{f}$ inverse $\lambda \uparrow f \downarrow$

Tension ↑ $\lambda \uparrow$ pitch → direct $f \uparrow$ $v \uparrow$

thicker string = lower frequency because the higher mass has a lower velocity

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.3 Sounds in Strings Revisited (p. 508)

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.3 Sounds in Strings Revisited (p. 508)

Checking Up (p. 514) # 1-4

Physics to Go (p. 517) # 1, 2, 3, 5, & 7

IWBAT calculate the wavelength of a standing wave on a string, and describe how the pitch of the sound produced by a vibrating string depends on the wave speed, wavelength, and frequency of the waves on the string.

5.4 Sounds from Vibrating Air (p. 518) 2/01/17

WDYS: *I see people making noise out of bottles another one whistling another person making music out of pipes, I see a cat.i see four kids, the first girl is blowing into a glass bottle the second boy is blowing in a straw the third boy is kneeled and is playing music out of pipes, the last girl is blowing on a tube, on the floor there is a lot of bottles and straws and tubes, the cat looks like it's running away.*

WDYT: *I think organ pipes and flutes produce sound by people blowing into them and also they produce different sounds because of the parts of the instrument you cover. For example in a flute it has a lot of little holes that you can cover and depending which ones you cover you get certain sounds.flutes and organ pipes produce sound by blowing on them.*

5.4 Sounds from Vibrating Air (p. 518) 2/01/17

IWBAT

- identify standing waves in different kinds of air-filled tubes
- observe how pitch changes with the length of the tube
- observe the effect of closing one end of the tube on the pitch of the sound
- observe sound bending around corners and spreading
- relate observations of pitch to drawings of standing waves
- summarize experimental results
- organize observations to find a pattern.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.4 Sounds from Vibrating Air (p. 518)

Investigate

Please exercise caution when working with the glass test tubes.

Do:
Parts A & B
Part C if time remains today.

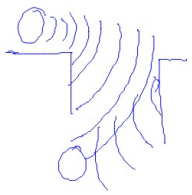
IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

5.4 Sounds from Vibrating Air (p. 518)

Physics Talk (p. 521)

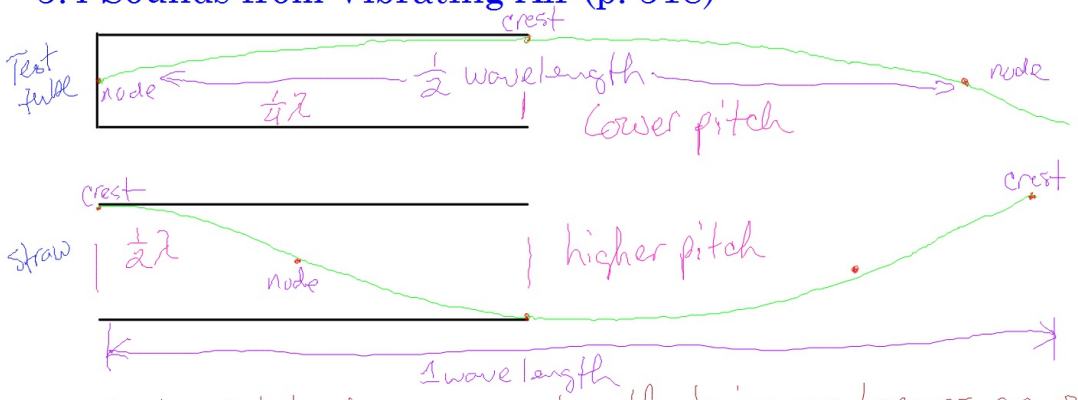
The molecules of a medium compress together or spread apart as the sound wave passes. Where the molecules cannot move, the amplitude is zero.

The ability of sound waves to spread out or change direction as they emerge from an opening is diffraction



IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

5.4 Sounds from Vibrating Air (p. 518)



A closed tube has a wavelength twice as long as an open tube of the same length. The longer wavelength has a lower pitch. This is because $\frac{1}{2}$ of a wave fits inside an open tube, but only 1/4 of a wave fits inside a closed tube.

IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

5.4 Sounds from Vibrating Air (p. 518)

Checking Up (p. 523) # 1-3

Physics to Go (p. 526) # 1, 2, 3, 4, & 8

Skip 3b's drawing

IWBAT identify standing waves in different kinds of air-filled tubes, observe how pitch changes with the length of the tube, observe the effect of closing one end of the tube on the pitch of the sound, observe sound bending around corners and spreading, relate observations of pitch to drawings of standing waves, summarize experimental results, and organize observations to find a pattern.

5.5 Shadows (p. 530) 2/06/17

WDYS: *I see a cat standing in front of a lamp but its reflection is small and the mouse's reflection is bigger probably due to the fact that the cat is closer to the lamp then the cat which the light has more to cover up that's why it is shown in a larger figure.I see a mouse and a cat, and their shadows; and some lamps showing how their shadows are different sizes for each one*

WDYT: *What i think is it depends where the sun is positioned and what makes a fuzzy shadow is depending whether the light is bright or not or even how far apart you are from the light. I think we're gonna be learning about shadows and how they change sizes depending on the angle of the light makes a difference on it.*

5.5 Shadows (p. 530) 2/06/17

IWBAT

- observe that light rays travel in straight lines
- analyze shadow patterns
- explain the size of shadows

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.5 Shadows (p. 530)

Investigate

Physics Talk (p.533)

- Light travels in a straight line (rays, beams)
- Shadows are longer with smaller angles between the light source and the surface
- Umbra - full shadow (no light)
- penumbra - partial shadow (some light)
- the penumbra is inbetween the umbra and the places that receive full light

CU (p. 534) #1-3

IWBAT observe that light rays travel in straight lines, analyze shadow patterns, and explain the size of shadows.

5.6 Reflected Light (p. 538) 2/08/17

WDYS: *I see a boy, a dog, a mirror, the moon, stars, a mattress, lamp, book, pillow, purple blanket/sheet, bare walls, and a window which the moon and stars are seen, also are reflected through the mirror. I see a boy laying on his mattress and a mirror in front of him that is reflecting the outside which is the moon and some stars and his window, the dog that is on the mattress with him is howling, the boy looks happy*

WDYT: *You have to be in front of the mirror and you need light; it cannot be completely dark. If you want to see more of yourself in the mirror, then you can either get a bigger mirror or step away from the mirror.you need to stand in front of the mirror not beside it and can't be blind, there has to be some light. Get a bigger mirror, standing further away from the mirror can see yourself fully.*

5.6 Reflected Light (p. 538)

IWBAT

- observe the reflection of light by a mirror
- identify the normal plane of a mirror
- measure angles of incidence and reflection for a plane mirror
- collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror
- observe changes in the reflections of letters
- identify patterns in multiple reflections.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.6 Reflected Light (p. 538)

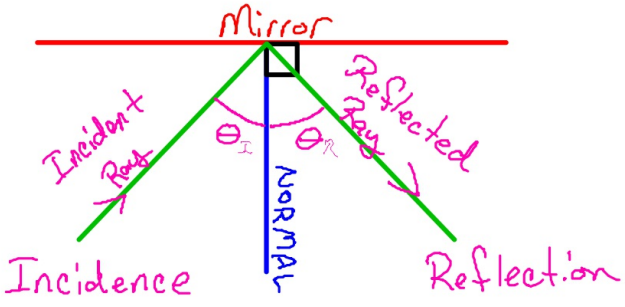
Investigate

Follow all safety procedures.

IWBAT observe the reflection of light by a mirror, identify the normal plane of a mirror, measure angles of incidence and reflection for a plane mirror, collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror, observe changes in the reflections of letters, and identify patterns in multiple reflections.

5.6 Reflected Light (p. 538)

Physics Talk (p. 541)



As the angle of incidence increases, so does the angle of reflection (as measured from the normal).

Law of Reflection

$\angle I = \angle R$

The image of an object in front of the mirror appeared to be behind the mirror. The image appears to be the same distance behind the mirror as the object is away from the mirror.

IWBAT observe the reflection of light by a mirror, identify the normal plane of a mirror, measure angles of incidence and reflection for a plane mirror, collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror, observe changes in the reflections of letters, and identify patterns in multiple reflections.

5.6 Reflected Light (p. 538)

Checking Up (p. 543) # 1-3

What Do You Think Now? (p. 544)

Physics to Go (p. 546) # 1, 2, 3, 4, 7, & 8

IWBAT observe the reflection of light by a mirror, identify the normal plane of a mirror, measure angles of incidence and reflection for a plane mirror, collect evidence for the relationship between the angle of incidence and angle of reflection for a plane mirror, observe changes in the reflections of letters, and identify patterns in multiple reflections.

5 Mini-challenge 2/10/17

In the next 45 minutes you need to do the following:

- *review* what you have learned about the creation and propagation of sound,
- *decide* on what kind of instruments you will use in your presentation, and
- *design* these instruments.

5.7 Curved Mirrors (p. 548) 2/13/17

WDYS: *I see two guys and a little girl, standing in front of three different mirrors, the first guy in red looks wider from his reflection, he is further away, the second guy in black is all big and has muscles he is not to close to the mirror but his reflection he looks tall and skinny, the girl is up close to the mirror her reflection looks all wobbly, the cat looks scared so he is running. I see three mirrors and three people, in the mirrors, the peoples figure are all different, and there is a cat, green wall and a wooden floor.*

WDYT: *it is different because when we look in a curved mirror our reflection is wobbly and when we look at a ordinary flat mirror we look good no difference in our face.The way you see in curved mirrors is different than what you see in original flat mirrors is by the way they are shaped/curved to change your figure. With the regular mirror, it is striaght with no curves so you see your regular self.*

5.7 Curved Mirrors (p. 548)

IWBAT

- identify the focal point and the focal length of a curved mirror
- observe virtual images in a convex mirror
- observe real and virtual images in a concave mirror
- measure and graph image distance vs. object distance for a concave mirror.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.7 Curved Mirrors (p. 548)

Investigate

Follow all safety precautions.

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.7 Curved Mirrors (p. 548)

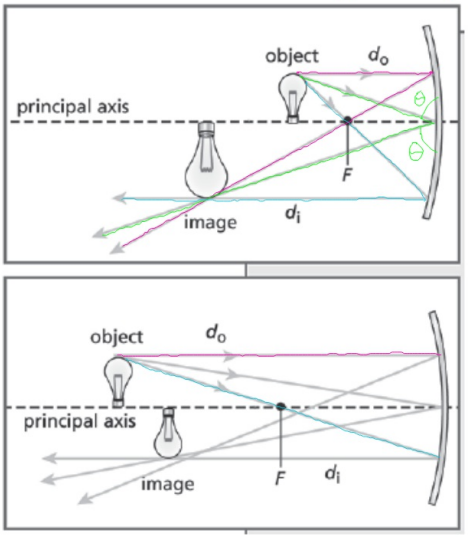
Physics Talk (p. 551)

Real image - can be projected, created with a concave mirror

Virtual image - cannot be projected, convex mirror or plane mirror, object appears to be behind the mirror

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.7 Curved Mirrors (p. 548)



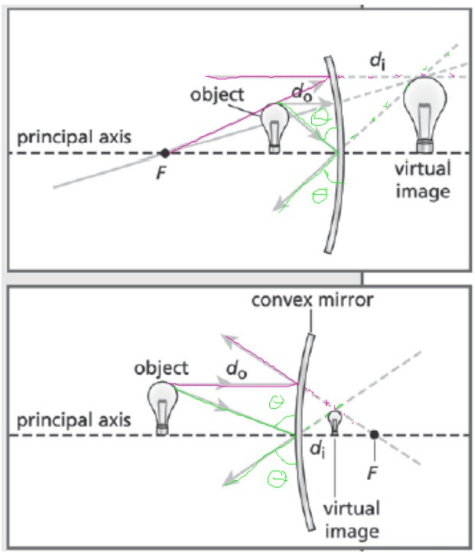
$d_o > F$

$d_o >> F$

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.7 Curved Mirrors (p. 548)

$d_o < F$



http://www.youtube.com/watch?v=jtTBOMVMSYM

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.7 Curved Mirrors (p. 548)

Checking Up (p. 552) # 1-3
What Do You Think Now? (p. 554)
Physics to Go (p. 555) # 1, 2, 3, 5, 6, 11, & 13

IWBAT identify the focal point and the focal length of a curved mirror, observe virtual images in a convex mirror, observe real and virtual images in a concave mirror, and measure and graph image distance vs. object distance for a concave mirror.

5.8 Refraction of Light (p. 558) 2/15/17

WDYS:

WDYT:

5.8 Refraction of Light (p. 558) 2/15/17

IWBAT

- observe refraction
- measure the angles of incidence and refraction
- measure the critical angle
- observe total internal reflection.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

5.8 Refraction of Light (p. 558)

Investigate

Observe all safety precautions.

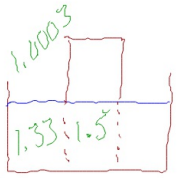
IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

5.8 Refraction of Light (p. 558)

Physics Talk (p. 561)

Snell's Law

Index of refraction – how much light bends when it enters a transparent material, each material has their own specific index



SOH

Sine = $\frac{\text{opposite}}{\text{hypotenuse}}$

from low index → higher index, light bends toward the normal

from high index → low index, light bends away from the n.

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

5.8 Refraction of Light (p. 558)

critical angle: the angle if incidence at which a light ray passing from one medium to another has an angle of refraction of 90°.

$\theta_I >$ critical angle, total internal reflection

index of refraction $= \frac{c}{\text{speed of light in material}}$

$c = 2.99 \times 10^8$ m/s

http://www.youtube.com/watch?v=uQE659ICjqQ

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

5.8 Refraction of Light (p. 558)

Checking Up (p. 562) # 1-3

What Do You Think Now? (p. 563)

Physics to Go (p. 565) # 1, 2, 3, 4, 5, & 6

IWBAT observe refraction, measure the angles of incidence and refraction, measure the critical angle, and observe total internal reflection.

5.9 Effect of Lenses on Light (p. 567) 2/23/17

WDYS:

WDYT:

5.9 Effect of Lenses on Light (p. 567) 2/23/17

IWBAT

- observe real images formed by convex lenses
- relate image size and position to object size and position and the properties of your lens.

Via

- Participating in collaborative experiments
- Team and whole class discussions to clarify key concepts
- Collaboratively answering questions targeting key concepts

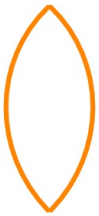
5.9 Effect of Lenses on Light (p. 567)

Investigate

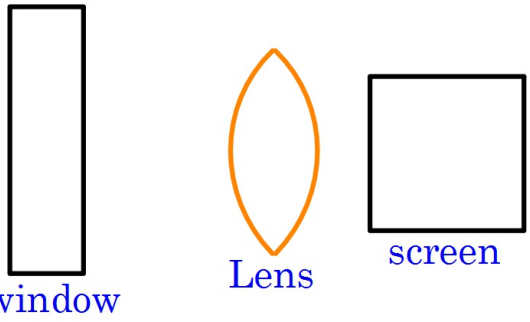
1 & 2) Make the sketches in your log.

Observe caution: the light bulbs will get very hot

1a .



2a .



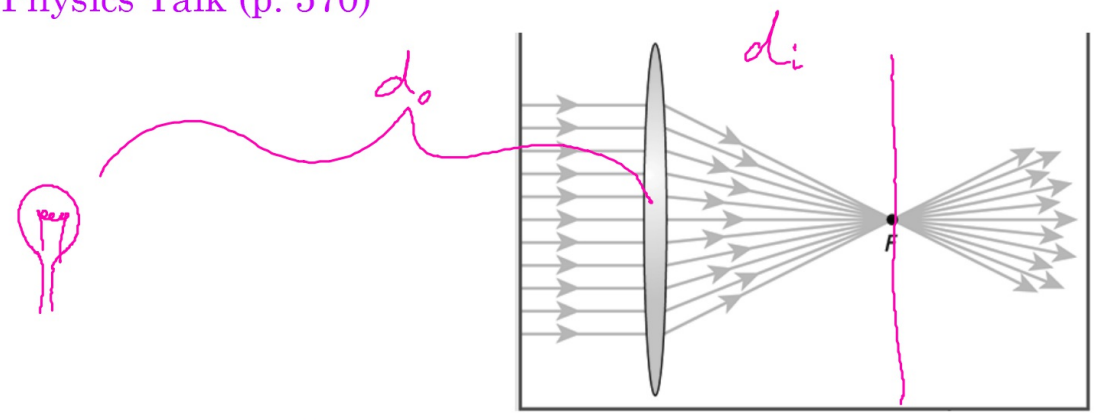
Skip step 9.

If time permits, do 10 b-d, 11 & 12.

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

5.9 Effect of Lenses on Light (p. 567)

Physics Talk (p. 570)



$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

$$\frac{1}{f} = \frac{1}{65} + \frac{1}{27} = 0.0523$$

$$f = 19.12 \text{ cm}$$

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

5.9 Effect of Lenses on Light (p. 567)

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

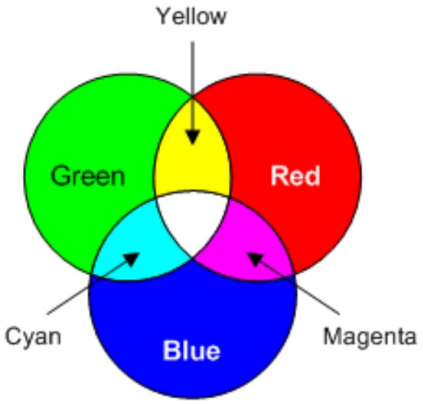
5.9 Effect of Lenses on Light (p. 567)

Checking Up (p. 571) # 1-3
What Do You Think Now? (p. 573)
Physics to Go (p. 574) # 1, 2, 3, 5, 7, & 13

IWBAT observe real images formed by convex lenses, and relate image size and position to object size and position and the properties of your lens.

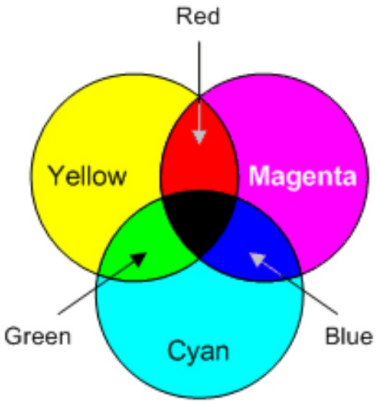
5.10 Color (p. 577)

Additive Mixing



Lights

Subtractive Mixing



Pigments

IWBAT observe combinations of colored lights, and predict patterns of colored shadows.

Chapter 5: Let Us Entertain You 03/01/17

Read pp. 584-589

Chapter Challenge Presentation (03/02/17)

5 pts 2-4 min performance (just sound & light)
5 pts Sound (3) - make the instruments, voice, part can be prerecorded
Light (2) - laser or regular lamp
5 pts Entertaining
5 pts Creativity
10 pts Explain the physics

Also due tomorrow:
- WDYS/WDYT
- Vocab
- Notebooks